FINE NEEDLE ASPIRATION CYTOLOGY, ITS CORRELATION WITH HISTOPATHOLOGY IN THYROID TUMOURS

THESIS

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DOCTOR OF MEDICINE

(PATHOLOGY)

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C O N T E N T S

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C E R T I F I C A T E

This is to certify that the work entitled "FINE NEEDLE ASPIRATION CYTOLOGY, ITS CORRELATION WITH HISTOPATHOLOGY IN THYROID TUMOURS" is being submitted for M.D.(PATHOLOGY) has been carried out by Dr. ARUN KUMAR SHARMA himself in this department.

He has put necessary stay in the department as required by the regulation of Bundelkhand University, Jhansi.

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This work fulfils the basic ordinances governing the submission of thesis laid down by Bundelkhand University, Jhansi.

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(ARUN KUMAR SHARMA)

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INTRODUCTION

I N T R O D U C T I O N

Nodules in the thyroid have always commanded a great deal of attention because they are some times visible, are often palpable by the patient and always raised the question of cancer (Klo n off and Green Span, 1982). The prevalance of nodules in thyroid in children has been reported to vary between 0.22 and 1.5% depending on the series studied; it increases linearly at a rate of 0.08% per year, begining at an early age and extending to the eight decade (Rajiski and Gharib, 1985).

The prevalence of thyroid nodules of all types is increased five fold in individuals exposed to ionizing radiations. Only few clinicaly palpable nodules are cancers. Reports from surgical clinics, however, point to a much higher incidence of cancer in nodular glands, with estimates ranging up to 20 to 30%. It can reasonably be concluded that thyroid nodules are very common but thyroid cancer is vary uncommon.

Despite all the epidemiologic data, the patients is not a statistic, and so every nodule demands careful appraisal. Short of anatomic study, there are no certain methods of differentiating non-tumorous nodules from benign or malignant neoplasms. Approximately 50% of clinically

apparent single nodules prove to be dominant nodules of multinodular goiters on pathologic examination (Rojiski and Gharib, 1985).

Of the true salitary nodules, 70 to 80% prove to be adenomas, while 10 to 20% are carcinomas. A variety of other lesions, including foci of thyroiditis, cysts and areas of fibrosis, account for most of the remainder of other "Solitary" nodules. It is evident from these findings that many lesions of the thyroid may present as nodules, and indeed, in 10% of the cases no thyroid abnormality is present.

In general women are affected more frequently than men in a ratio of 3 : 1. Fine needle aspiration biopsy represent a highly reliable approach for the diagnosis and classification of thyroid nodules and is of particular value as a screening procedure for patients before surgery (Colacchio et al, 1980). The F.N.A.C. procedure is relatively painless and results are often available while the patient is still in the office.

Fine needle aspiration cytology is a study of cells obtained by fine needle under vaccum. The specimen consists of minute quantity of tissue or fluid. Any area of the body can be a suitable target for aspiration biopsy without any danger.

In cases of malignancies particularly diagnosed on clinical examination, the diagnosis obtained by 'Fine needle aspiration' may substitute for conventional biopsy procedures.

Fine needle aspiration biopsy has emerged slowly since Martin and Ellis (1930) conducted their study and has been refined over 25 years by various authors (Coranillim et al, 1955; Craver and Binkley, 1938; and Kline, 1980).

The term aspiration biopsy cytology (ABC) was used by Zajicek (1974) and Lowhagen (1979). It was chosen to clearly distinguish aspiration from exfoliative cytology and to emphasize its simplicity.

Nodular enlargment of the thyroid gland is frequent and constitutes the commonest indication for thyroidectomy. The thyroid nodule can be cystic or solid. Most of the cystic nodule are benign in nature, except few cases of papillary carcinoma. Among the solid nodules also only about three percent are malignant in nature. However, thyroid carcinomas closely resembles its benign counterpart in physical characteristics measurable physiological parameters such as serum T4/T3 levels and ultrasonic characteristics. Therefore, the surgical excision of the nodule and its histologic examination is the only way to differentiate between the more frequent benign and much less frequent

malignant nodules. Since most of the nodules are benign, symptomless and small in size, they do not require surgical excision.

Fine needle aspiration (FNA) cytology of thyroid is a valuable adjunct to preoperative screening in the diagnosis of thyroid nodules. In its interpretation however it has its own peculier problems, some of which are inherent to the needle aspiration technique while others extend even to the terrain of histopathologist.

A study of the preoperative aspiration cytologies in consecutive patients with primary malignant tumours or benign thyroid tumours showed a sensitivity of 0.57 and specificity of 0.98. The sensitivity of FNA cytology in medullory and undifferentiated carcinomas was 0.82 and 0.84, respectively. The sensitivity was only 0.58 for papillary carcinomas (excluding occult carcinoma) and 0.42 for fallicular carcinoma.

The specificity of FNA cytology of thyroid tumours are found to be high enough to permit surgical intervention after a cytodiagnosis of malignancy. There has been increasing interest in including this method as a routine preoperative diagnostic tool for the diagnosis of thyroid tumours.

According to H. Ruben Harach, 1989, thyroid FNAC should be instituted as a reliable diagnostic method, even

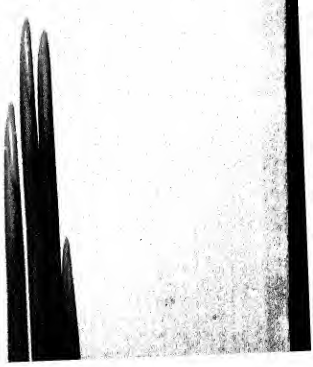
since (1) it permits a rather accurate histologic approach as demonstrated by cytohistologic correlation, thus allowing physicians and surgeons to indicate further laboratory studies needed and to plan appropriate medical treatment and/or surgery.

(2) It avoids unnecessary surgery for patients with benign lesions. The latter point is emphasized by the significant increase of surgically resected malignant tumours during the diagnostic period (44%) as compared with the learning period (14%). Thus helping to reduce the costs of health care in public health institutions.

Results of ultrasonography, radionuclide perfusion studies along with xero-radiography have been compared with FNAC of cold thyroid nodule. FNAC has been advocated as the method of choice as regards accurate diagnosis, their typing, higher sensitively, and cost effectiveness (Jayaram and Aggarwal, 1989).

It was therefore proposed to take up study of thyroid neoplasms by FNAC technique as an early diagnostic tool and to have histopathologic correlation.

MATERIAL AND METHODS



MATERIAL AND METHODS

The present study has been conducted on the patients attending the out patient department and admitted patients in M.L.B.Medical College Hospital,Jhansi.Detailed clinical findings, history and examination findings has been recorded on a working proforma (Appendix - I).

Fine Needle Aspiration Cytology (FNAC) of thyroid has been done and fixed in alcohol and ether then stain by Papanicolaou's staining method.

On follow up thyroid tissue is collected and fixed in formaline and after routine fixation stain by Haematoxylin and Eosin staining.

MATERIAL FOR FNAC :

1- Spirit swabs to clean the skin
2- Fine needle 21-23 gauze
3- Syringe 10 or 20 ml
4- Fixative
5- Slide with labels

METHOD FOR FANC :

1- Cleaning of skin
2- Introduction of needle
3- Needle manuovers under negative pressure

Vacuum created by retraction of plunger, the needle is moved back and forth in stabbing motion. Negative pressure (vacuum) is maintained until the needle is withdrawn to subcutis.

4- Withdrawal of needle

5- Immediate slide preparation and fixation

Specimen almost entirely contained with in the needle lumen is forcibly ejected on slide. Detach the needle to introduce air into the syringe and than reattaching it, enhance cellular expulsion. The aspirate is spread thinly and evenly by a second slide.

6- Smear fixed for Papanicolaou's staining in alcohol and ether.

7- Staining of slide by Papanicolaou's stain

Papanicolaou's Staining Method :

Fixed smears of FNAC were subjected to following processing :-

1- 80% Ethyl Alcohol ----- 5 (dips) --- 8-10 second

2- 70% Ethyl Alcohol ----- 5 (dips) --- 8-10 second

3- 50% Ethyl Alcohol ----- 5 (dips) --- 8-10 second

4- Distilled water ----- 10 (dips) --- 16-20 second

5- Harris Hematoxylin without acetic acid -- 6 minute

6- 0.5% aqueous solution of Hcl.	--	3-5 (dips)	-- 5-10 second
7- Running water	--		-- 6 minute
8- Dehydration in ethyl alcohol (50% - 95%)	--	5 (dips each)	-- 8-10 second
9- Orange G- 6	--		-- 2 minute
10- 95% Ethyl Alcahol (3 times)	-	5 (dips)	-- 8-10 second
11- EA - 50	--		-- 2- 3 minute
12- 95% Ethyl Alcohol	--	5 (dips)	-- 8-10 second
13- 95% Ethyl Alcohol	--	5 (dips)	-- 8-10 second
14- Absolute Ethyl Alcohol	--	5 (dips)	-- 8-10 second
15- Alcohol + Xylene	--	5 (dips)	-- 8-10 second
16- Xylene (5 times)	--	10 (dips)	-- 16-20 second
17- Mount in D.P.X.			

Staining method for tissue section (H & E Stain) :

(E.C. CLAYDEN, 1971)

1- Absolute Alcohol	----	----	10-15 second
2- 95% Alcohol	----	----	10-15 second
3- 95% Alcohol	----	----	10-15 second
4- Tap water	----	----	10-15 second
5- Stain with Haematoxylin	----	----	10-20 minute
6- Tap water	----	----	15-30 second
7- Differentiate with 1% acid alcohol.	----	----	10-20 second
8- Tap water	----	----	10-20 second
9- Tap water	----	----	5 minute
10- Counter stain with 1% eosin		----	1- 5 minute

11- Tap water	----	----	10-15 second
12- 95% Alcohol	----	----	10-15 second
13- 95% Alcohol	----	----	10-15 second
14- Absolute Alcohol	----	----	10-15 second
15- Absolute Alcohol	----	----	10-15 second
16- Xylene	----	----	10-15 second
17- Mount in D.P.X.			

P R O F O R M A

TITLE : FINE NEEDLE ASPIRATION CYTOLOGY ITS CORRELATION WITH HISTOPATHOLOGY IN THYROID TUMOURS.

I. CLINICAL DATA Case No._____

1. Patient's Name _____ Age/Sex _____

2. Address _____

3. Clinical Diagnosis _____

4. History of present illness :

a) Duration

b) Pain : Present/Absent

c) Anhydroses: Present/Absent

d) History of: Present/Absent trauma.

e) Presenta- : Unilateral/ tion. Bilateral

f) Rate of growth : Slow/Gradual Rapid

g) Mode of treatment : Thyroxine/ Iodine/Drugs

h) Physiological: Pregnancy/ state. Puberty/ Adult

i) Pressure : Dysphagia/ symptoms Dysnoea/Hoarse- ness of voice

5. Family history _____

6. History of past illness _____

7. General Examination :

Pulse	BP	Resp	Tremor
Temp.	Oedema		Lymphnode

8. Local Examination :

1. Number : Single/Multiple
2. Size :
3. Surface : Smooth/Nodular
4. Mobility: Movile/Fixed
5. Consistency : Cystic/ Soft/Firm
6. Overlying skin : Normal/affected
7. Tenderness : Present/Absent
8. Exophthalmos: Present/Absent
9. Myosis : Present/Absent
10. Pulsation : Present/Absent
11. Movement of: Present/Absent deglution

Cont...2

II. PATHOLOGICAL DATA

1. FNAC Findings (No._____) Diagnosis _____

	PAP Stain	Remarks	MGG Stain	Remarks
1. Follicular cells				
2. Colloid				
3. Inflammatory cells				
4. Malignant cells				
5. Any other findings				

2. Histopathological Findings (No._____)

(1)

(2)

(3)

(4)

DIAGNOSIS :

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Thyroid gland is one of the most important and most active endocrine gland. It is located anterior to trachea measure 2x3x6 cm weight upto 20-25 gram. Histologically gland consist of acini of variable sizes, filled with differentially staining colloid and in various stages of development. Acini are lined by cuboidal to columnar epithelial cells. Dispersed within these are special "C" cells concerned with calcitonin secretion. Physiologically gland secret hormone thyroxin (T_4) and (T_3) which regulate iodine metabolism. The gland activity is under the hormonal influences from ant pitutary whose activity is inturn controlled by thyroid secretions.

Diseases of the thyroid are of great importance because most are amenable to medical or surgical management, they present principally as hypothyroidism, hyperthyroidism, tumours and tumour like enlargement of glands. Thyroid neoplasm have been classified into various categories (WHO,1974).

Carcinoma of the thyroid gland is rare between 0.4% to 1.6% of all human cancers with an average of 0.94% (Farooki, 1969). Few reports on this subjects in Indian literature are available (Budhraja et al, 1972, Vickers et al, 1981). Analysis of various reports on the incidence

of different types of malignant tumours of thyroid in India reveal wide variation, while Schroff and Paymaster (1958), DaCosta et al (1977) and Patrica Vickers et al (1981) reported a higher incidence of follicular carcinoma in their series; Udupa (1969), Budhraja (1972), Sachdeva et al (1974) and R. Tandon et al (1988) have reported a higher incidence of papillary carcinoma.

In order of frequency simple (non functional) enlargement, hyperthyroidism, multinodular goitre, thyroiditis and a solitary nodule, only 0.1 - 0.2% clinically palpable nodules are cancers. Since 1935 the over all incidence of thyroid carcinoma had tripled, Irradiation during childhood has the greatest risk from 4-9%, individuals irradiated during infancy have developed thyroid carcinoma ofter a meanlatent period of 20 years. In other study, 80% children of thyroid carcinoma were found irradiated previously. In Japan incidence of thyroid carcinoma is 6.7% in atomic bomb exposed persons.

Increased risk for thyroid carcinoma has been associated particularly with high doses of irradiation, young age at time of exposure and female sex. Thyroid carcinoma can occur at all ages, but about 15% of thyroid carcinoma are first diagnosed under age of 30 years and most are diagnosed in 5th and 6th decades.

Classification of Tumours of Thyroid Gland (W.H.O., 1974) :

I. EPITHELIAL TUMOURS :

(A) BENIGN :
1. Follicular adenoma
2. Others

(B) MALIGNANT :
1. Follicular carcinoma
2. Papillary carcinoma
3. Squamous cell carcinoma
4. Undifferentiated (Anaplastic) carcinoma :
   (a) Spindle cell type
   (b) Giant cell type
   (c) Small cell type
5. Medullary carcinoma

II. NON EPITHELIAL TUMOURS :

(A) BENIGN

(B) MALIGNANT :
1. Fibrosarcoma
2. Others

III. MISCELLANEOUS TUMOURS :

(A) Carcinosarcoma

(B) Malignant haemangio endothelioma

(C) Malignant lymphoma

(D) Teratoma

IV. SECONDARY TUMOURS

V. UNCLASSIFIED TUMOURS

VI. TUMOUR LIKE LESIONS :

(A) Adenomatous (Nodular) goitre

(B) Cystic lesions

(C) Ectopic thyroid tissue

(D) Chronic thyroiditis

(E) Amyeloid goitre

TUMOURS OF THYROID :

In the thyroid, as in other endocrine glands. It is difficult to distinguish between hyperplastic and neoplastic conditions and between benign and malignant tumours. This problem is even more complex in endemic goitre areas where hyperplastic and neoplastic conditions are associated. Indeed, it may be more difficult to distinguish between hyperplastic and neoplastic conditions than between adenoma and carcinoma. The usual criteria for cancer, such as cellular atypia and mitotic activity are not always helpful in the diagnosis of thyroid carcinoma. For example, well differentiated follicular carcinoma may be histologically distinguished from benign conditions only by demonstrating vascular or capsular invasion.

Diagnosis of diseases by needle aspiration cytology was originated back in 1904 when Greig and Gray isolate trypanosomas from lymphnodes to confirm the diagnosis of sleeping sickness by puncture with a hypodermic syringe.

Although Papanicoalou is recognised as father of exfoliative cytology and the term aspiration biopsy cytology was used by Zazicek (1974) and Lowhagen (1979). The term was chosen to clearly distinguish aspiration from exfoliative cytology. Two terms are consistently used for aspiration, fine needle aspiration cytology(FNAC) or Fine needle aspiration biopsy cytology (FNABC) by other authors.

The merit of aspiration biopsy from thyroid was discussed by Stewart (1933). Judging from 45 cases, he felt that the procedure was useful for the diagnosis of anaplastic carcinoma. Lipton and Abel in (1944) measured aspirated cells to evaluate hypothyroidism and Tanpka and associates (1948) studied aspirates from colloid goitres.

Aspiration biopsy cytology (ABC) in thyroid goitre studied by Solderstom (1952) and adolescent goitre by Nilsson, L.R. and Persson (1964). Aspiration biopsy cytology of thyroiditis studied by Persson, P.S. (1968) and Einhorn J. et al (1962).

Out of 1000 patients hospitalized for a neck mass, thyroid nodule was responsible for almost half of the cases (Slaughter, 1960), only 6% were malignant (Skandalokis et al, 1960), where aspiration biopsy is practised surgery is halved (Miller, J.M. et al, 1979). Crile and associates (1979), stated that by routine use of needle biopsy "In 82% patients with palpable lesions. It was possible to rule out the presence of cancer in suspicious area and to use medical treatment instead of thyroidectomy.

BENIGN EPITHELIAL NEOPLASMS :

Adenoma :

Adenomas range in size from a few millimeters to 8 cm or so in diameter, present as solitary, discreate, small nodule, and contain follicles of varying size and in variable proportions, on cross section they range from pale tan to gray are soft and flashy and sometimes have foci of softening, hemorrhage, or central fibrosis with calcification.

Morphological criteria used to identify an adenoma are :-

1. Complete fibrous encapsulation.
2. A clear distintion between architecture inside and outside the capsule.

3. Compression of the thyroid parenchyma around the adenoma.
4. Lack of multinodularity in remaining gland.

All adenomas are characterized by some variation in the size and number of follicles as well as in the abundance of interfollicular stroma.

HISTOPATHOLOGY :

1. Follicular adenoma :
   (i) Solitary with well defined capsule.
   (ii) Adjacent glandular tissue may be compressed.
   (iii) Composed of follicles of various sizes or may show a trabecular pattern in embryonal :
   - Tubular or microfollicular in fetal.
   - Normofollicular in simple.
   - Macrofollicular in colloid adenoma.
   (iv) Degenerative changes as haemorrhage, oedema, fibrosis, calcification, bone formation and cyst formation are common.
   (v) Tumour cells resemble those of the thyroid follicles, some time oxyphilic (so called Hurthle cells) or clear cells may occur.

The thick fibrous capsule of adenomas usually contains numerous large venous sinusoids and occasional eccentrically thickened arteries. The peripheral margin

of cellular adenomas is not always smooth and irregular collection of tumours cells may be incorporated into the inner protion of the capsule giving a false appearance of invasion.

2. Other Adenomas :

(a) Papillary adenoma :

Tumours similar to follicular adenomas but with variable amounts of papillary have occasionally been described and called papillary adenoma.

(b) Atypical adenoma :

Rarely, very cellular, encapsulate, fleshy tumours, a range of structural patterns is found and there are foci of neoplastic cells with very bizare giant cell nuclei. The cytological characteristics suggest malignancy, but mitotic figures are infrequent and the capsule and venous sinusoids are not invaded.

CYTOPATHOLOGY :

Aspiration in follicular ademona is monomorphic with rather cohesive, small polarized sheets or acini arranged around colloid. The nuclei with prominent chromocentres are usually uniform small and eccentric within a granular cytoplasm or along as necked nuclei. There sometimes, is anisonucleosis.

Cytopathology in papillary and atypical adenoma reveals a dense smear with nuclear crowding and overlaping. Pleomorphic and spindle cells are some times seen. The nuclear cytoplasmic ratio is greater in the atypical adenoma than in the follicular adenoma. There may be anisonucleosis and minimal nuclear membrane irregularity moderate cohesion, finely granular chromatin and absence of macronucleoli distinguishes this neoplasm from carcinoma (Lang, W. et al, 1978).

Papillary carcinoma :

It is the most common form of thyroid cancer in adults and children. Incidence is 54% to 68% of thyroid malignancies occur, approximately 80% of thyroid cancers is seen in individuals under 40 years of age, largely because the less well differentiated neoplasms tend to occur in old persons. The tumour usually presents as an incidental, painless lump in the neck. Not infrequently, the primary lesion remains occult and the first sign of the disease is metastatic enlargement of a cervical lymph node, formerly, enlarged cervical lymph node without any palpable thyroid enlargement or nodularity was regarded as lateral aberrant thyroid.

It is a malignant epithelial tumour containing papillary structures. Papillary carcinoma may be pure but over half contain an admixture of follicular elements.

Macroscopically as a discrete, but not encapsulated, firm, 1-5 cm in diameter, embeded within a thyroid lobe. Occasionally tumours are larger and these are liable to invade the capsule of the gland. The tumour tends to be fibrotic and some are cystic.

Microscopic picture is dominated by papillae consisting of a capilary and connective tissue network, supporting epithelial cells that often possess overlapping pale, so called ground glass nuclei.

Cytoplasm may be clear or oxyphilic. The follicle formation is almost always present and sometimes extensive small calcified spherical bodies (Psammoma bodies, calcospherites, microliths) are encountered frequently in papillary carcinomas but very rarely in other thyroid lesions also.

A characteristic feature of these tumours is their tendency to spread via the lymph vessels. Metastasis usually remain localized for a long period in the cervical lymphnodes e.g. lateral aberrant thyroid, metastasis of a latent papillary carcinoma.

In general all papillary tumours of thyroid should be regarded with the greatest suspicion, since true papillary adenomas are extremely rare. But macropapillary lesions of adenomatous goitre and papillary structures of diffuse hyperplastic goitre should not be confused with papillary carcinoma.

CYTOPATHOLOGY :

The aspirate contains a high concentration of cells in sheet, branching fronds, small papillary groups or, rarely isolated. Well differentiated carcinoma may be characterized by monomorphism. The cells of approximately 10 u have nuclei of about half the size of cellular volume. Nucleus is bounded by a slightly irregular membrane, contains finally dispersed chromatin and often an eosinophilic nucleolus, is a circumscribed pale area, occupying at least a quarter of nucleus is some time present. This is the intranuclear cytoplasmic inclusions so designated because electron microscopic studies indicate a cytoplasmic invagination into the nucleus. This inclusion has been identified in some non thyroid tumours and within benign cells of the adrenal gland, liver and kidneys.

Rounded, laminated, calcified psammoma bodies are usually associated with papillary carcinoma. They may be surrounded by atypical or malignant cells or by relatively normal ones. When the encircling cells appear benign, the unit may be mistaken for a colloid follicle. However it reacts positively to Von Kossa's stain for calcium.

Cystic degeneration of the papillary carcinoma may cause problems in interpretation of aspirate. There may be inflammatory cells and multinucleated giant cells, suggestive of thyroiditis.

Lowhagen et al (1974) observed papillary structures in 7 - 10% case, intranuclear inclusions in 50% to 90% and psammoma bodies, in 25% to 50% aspirates.

Edwin Gould, Laura Watzak et al (1989), investigated specificity and sensitivity of nuclear grooves and inclusions for papillary carcinoma. Ultrastructurally, these grooves and inclusions are cytoplasmic invaginations into the nucleus. Over all 100% papillary carcinomas contained nuclear grooves while 70% contained inclusion, grooves however, could be seen in 70% of non papillary neoplasms and 56% of non neoplastic conditions. Inclusions were present in 13% of non papillary neoplasms and were observe in non neoplastic conditions.

Nuclear groove, also called "Nuclear eyebrow" or "chromatin ridge". In fact, Kini (1984) mentioned chromatin ridge as a part of pathogonomic cytologic tetrad for papillary carcinoma along with pale enlarged nuclei, dusty chromatin, nucleoli and intranuclear cytoplasm inclusions.

A nuclear grooves was defined as a dark line extending usually from one side of the nuclear envelope close to the opposite side. Poorly defined, thinner lighter lines were also seen and were also interpretated as "groove". The number of nuclear grooves were semiquantitatively graded after examining multiple high power fields (Edwin Gould et al, 1989).

Grade O - No nuclear grooves present.

Grade I - Rare grooves (On the average less than 1 per 5 HPFs).

Grade II - Few grooves (On the average 2/5 HPFs).

Grade III - Frequent grooves (15 or more/15 HPFs).

In India also importance of nuclear grooves as an additional diagnostic criteria has been stressed up (Bhambhani et al, 1989).

The number of intranuclear vacuoles was also semiquantitatively graded.

Grade 0 - No nuclear inclusions present.

Grade I - Rare (1 per 10 HPFs)

Grade II - Few (2 or 3 per 10 HPFs)

Grade III - Frequent (10 per 10 HPFs).

In cytological preparations, nuclear vacuoles or intranuclear cytoplasmic inclusions are considered to be of diagnostic value and have been seen in anywhere from 30% to 90% of cases of papillary carcinoma (Christ et al, 1979; Jayaram Geeta, 1985; Kini, Miller et al, 1984).

Follicular Carcinoma :

Follicular carcinoma is second most common thyroid malignancy with frequence of 12% to 14% (Burke, J.D. et al 1977, occure more in females than males and

peak incidence is in 4th decades (Vickery, 1978). A diagnosis of follicular carcinoma implies upto a 70% mortality at five years (Franssila, K., 1973).

It is biologically more aggesssive than the papillary carcinoma. Critical to the segregation of follicular from papillary carcinoma is the absence of ground glass nuclei, well formed papillal and psammoma bodies.

It is a malignant epithelial tumour with growth pattern and cells resembling those seen in mature or developing thyroid glands.

1- The tumours are composed of follicles of various sizes or of combinations of follicles and cords.

2- Nuclei are compact and hyperchromatic.

3- Cytoplasm usually resembles that of normal follicular cells, oxyphilic cells (so called Hurthle cells) or clear cells may be found in part or throughout the tumour.

Characteristic feature of follicular carcinoma is their tendency to spread via the blood stream and a distant metastasis, especially in the bone may be the initial presenting symptom. Lymph node metastasis is rare.

1- Well Differentiated Follicular Carcinoma :

These are tumours composed of follicles some times indistinguishable from normal thyroid tissue, adenomatous goitre, or adenomas. Some of these tumours have been called metastasizing adenoma, Malignant adenoma or metastasizing goitre.

2- Moderately Differentiated Follicular Carcinoma :

In this group the tumours show solid masses of cells or form trabecular patterns with varying degrees of differentiation into follicles. These tumours have been referred to as trabecular carcinoma and some have been called "WUNCHERNDE STRUMA LANGHAN'S".

The invasive obviously cancerous mass results in irregular enlargement of gland. The tumour is greyish white over grows the thyroid, replaces large parts of it, and extends through the capsule, adherent to or invade the trachea, muscle, skin and great vessels of the neck. In this infiltrative progression, the recurrent laryngeal nerves are often trapped. Both the localized and invasive forms often have an abundant fibrous stroma, hemorrhages, cyst formation, and areas of necrosis are frequently present.

Thyroglobulin may be demonstrated immunohistochemically.

There are several rare variants histologic patterns of follicular carcinoma (Ramzi S. Cotran et al 1989) :

- Cells with clear cytoplasm and closely resemble the clear cell carcinoma of kidney.
- Cells large and abundant cytoplasm (acidophelic) with small piknotic central nuclei closely resemble hurthle cells.
- Insular type, agreesive form of follicular carcinoma, showing predominantly solid growth patterns (Carcangiu, M.L. et al, 1984). Striking resembles with modullary carcinoma but thyroglobulin positive and calcitonin negative by immunohistochemically.

CYTOPATHOLOGY :

Aspirate from well differentiated carcinoma, there is an abundant, monotonous, monomorphic collection of follicular cells with slight anisonucleosis and some nuclear overlapping and crowding. They form follicles with discernable colloid or small sheets, or are isolated. Evenly granular cytoplasm may be moderate or scant. In contrast poorly differentiated form is readily identified because of its dense cellularily, dissociation, and marked anisonucleosis. The cells display irregular nuclear membranes and some macronucleoli.

Medullary Carcinoma :

Medulary carcinoma was first recognised as on entity distinct from follicular carcinoma in 1959 by Hazard and associates. This type of malignant epithelial tumours are less frequent types (Approximately 5-10%). It is the most versatile of thyroid carcinomas, Derived from para-follicular (c) cells with in the thyroid, medullary carcinoma is a prototypic neuroendocrine neoplasm. It has three distinctive features :-

(1) Its amyloid stroma

(2) Its genetic association

(3) Its elaboration of calcitonin and other peptides.

The amyloid in these tumours is derived from the neoplastic 'C' cells and represents altered calcitonin molecule with respect to genetic association perhaps 80-90% of these neoplasms occur sporadically, usually in adults, but 10-15% are encountered in children and teenagers.

Approximately 80-90% of medullary carcinoma secrete calcitonin, somatostatin and gastrin releasing peptide (Bombesin). They may produce histaminase, prostaglondins and (More rarely) ACTH, vasoactive intestinal peptide (VIP) and serotonin. Calcitonin and/or prostaglandins induce diarrhoea can seen in about 30% of patients of medullary carcinoma.

Macroscopically the tumour tissue may be soft and fleshy or firm and gritty, ranges from grey white to yellow brown. There may be foci of hemorrhage and necrosis in larger sections. Two patterns can be described macroscopically. Discrete tumours in one lobe, or numerous nodule that usually involve both lobes.

Microscopically tumour often containing amyloid, composed of spindle shaped, polygonal or round cells arranged in sheets, cords or trabecule, often tumour has a well defined organised pattern and, rarely, it forms follicle like structures and artifacts resembling papillae. Its histological pattern may resemble that of a carcinoid, a paraganglioma, an islet cell tumour or an undifferentiated carcinoma. Neoplastic cells have functional and structural characteristics of parafollicular cells (C. cells).

Ultrastructural studied usually disclose in all cytologic patterns membrane bound secretory granules that represent sites of storage of calcitonin and other peptides.

CYTOLOGY :

Aspirate with plasmacytoid, spindle or follicular type cells. These are patterned in sheets, small groups with no acini formation, or singly. The cells are similar in size or larger then follicular cells. The fine

granularity of the sometimes abundant cytoplasm is eosinophilic (Lowhagen, T., 1979). Plasmacytoid cells are triangular and characterized by binucleation or trinucleation. There may be some anisonucleosis of the usually ecentric nuclei as well as a few nucleoli. Diffuse or focal collections of amyloid, resembling colloid strands, may be apparent.

Amyloid can be specifically identified by special stain : a positive crystal violet stain indicates either amyloid or colloid (Lijunberg, O., 1972). But the more specific is congo red.

Soderstrom et al (1975) reviewed aspirates from 18 medullary carcinoma. The malignancy was correctly identified in 87% (including one occult carcinoma) and in 60%, the congo red stain was positive.

UNDIFFERENTIATED (ANAPLASTIC) CARCINOMA

Histopathology :

A malignant epithelial tumour, about 10% - 15% of all thyroid carcinoma belong to this group. These tumours usually occur in 7th and 8th decade of life and include some of the most malignant neoplasm encountered in human. Most neoplasms have usually involved large areas of the thyroid gland and indeed, have extended beyond its confines to

produce bulky masses. Invasion beyond the capsule, blood vessels involved, and foci of infarct necrosis highlight the aggressive rapid growth of these form of neoplasm.

This tumour is typically composed of varying proportions of spindle, giant or small cells, commonly imitating a sarcoma. Definite neoplastic epithelial structures can usually be found, although examination of multiple section may be necessary, often there is a mixture of components including squamous cells. Occasionally there are foci of bone, cartilage, and osteo clast like cells. In some cases the tumour seems to represent the terminal stage in the dedifferentiation of a follicular or papillary carcinoma in the primary lesson of the metastasis. In others, it may be associated with an adenoma or adenomatous goitre. In cases with remnants of collicular or papillary carcinomas the tumour should be placed in the undifferentiated carcinoma category. The undifferentiated carcinoma are the more aggressive thyroid tumours.

Variants :

(a) Spindle cell type : These tumours consist mainly of spindle cells.

(b) Giant cell type : These tumours are composed of varying proportion of giant cells, which predominant and spindle cells, Bizarre cell forms and nuclei are frequent, atypical mitosis may be numerous.

(c) Small cell type : These tumours are composed of cells that are smaller than those of follicular epithelium and have little cytoplasm. The cells are usually round or ovoid and nuclei hyperchromatic. The cells grow in compact clusters or in diffuse sheets resembling a malignant lymphoma.

Cytology :

Aspiration biopsy reveals bizarre, large cells. Many are isolated and may be mistaken for cells from a sarcoma. The cytoplasm is moderate in amount and clearly defined. Binucleation and multinucleation are common. Nuclear membranes are irregular, chromatin is clumped, and macronucleoli may be seen. Blood and necrosis are common. Cells from small cell tumour resemble histiocytic lymphoma. Dyshesine, small cell groups have scant cytoplasm and anisonucleosis. Rarely are there abnormal papillary forms (Lowhagen et al, 1974).

Squamous cell carcinoma :

A malignant epithelial tumour which are extremely rare with cells showing so called intercellular bridges and/or forming keratin.

This category is reserved for extremely rare tumours composed purely of squamous epithelium. Such type should not be confused with a direct extension from a cancer

of the larynx, trachea or oesophagus nor with a metastasis from a distant site nor with squamous metaplasia which is common in neoplasm and inflammation of the thyroid.

When squamous carcinoma cells are aspirated, the possibility of extension from a cancer in the larynx trachea or oesophagus, must be considered.

In cytologic specimens the most distinctive finding in highly differentiated cases is the presence of tumour cells of varying size with abundant orangeophilic cytoplasm indicative of keratin production. The tumour cells may occur singly, in small clumps or loose clusters. Much variation in size and shape is characteristic of this tumour type and bizarre form or elongated spindle shaped cells seen. Marked nuclear hyperchromasia with coarse chromatin is uniformly present.

Keratinized, degenerate, and anucleate squames are often present (WHO, 1977).

TUMOUR-LIKE LESIONS

A variety of non-neoplastic lesions may appear as swellings of the thyroid gland and be suspected clinically to be tumours and can be confused with neoplasm histologically.

ADENOMATOUS (NODULAR) GOITRE :

Deficiency of thyroid hormone leads to a spectrum of lesions begining with diffuse hyperplasia and often in an adenomatous goitre. Each stage of this process can simulate tumours, for example, the severe hyperplasia of some congenital goitres, macropapillary structure of hyperplastic epithelium, and the nodules in an adenomatous goitre. Macropapillary structures found in adenomatous goitres should not be confused with papillary neoplasms.

Whereas the uniformily of structure, the distinct encapsulation, and the compression of surrounding tissue are characteristics of follicular adenomas, such features at times may also be found in the nodules of adenomatous goitre, and distinction between the two entities may be impossible.

Cytologic differentiation of colloid nodules from follicular neoplasm has not been possible because of scanty amount of tissue obtained by FNAC, and in a cellular bloody aspirate, most authors find differentiation difficulty between follicular neoplasm and cellular colloid (Block et al, 1983; Kline, T.S., 1981; Koss et al, 1984; Suen et al, 1983; and Orell et al, 1986).

The distinction between these two entities is important because colloid nodule may be managed. Conservatively, and follicular neoplasms need to be excised since

the determination of malignancy depend on histologic evaluation of capsular and vascular invasion (Ackerman et al, 1985; Lowhagen, T., 1979).

Ignatius, T.M. and Rose, W.S. (1989) concluded that presence of hyperplastic papillae and fragments of dilated follicles in aspirates of colloid nodules are useful for distinguishing colloid nodules from follicular neoplasm.

The colloid containing aspirates almost always indicate the presence of a colloid nodule (Friedman et al, 1979; Lever, 1985). Fluid containing aspirates may occasionally come from papillary carcinoma or anaplastic carcinoma, such aspirates are usually cellular and diagnosis can be made from nuclear features (Chanet al, 1986). Bloody aspirate present problem in differentiating cellular colloid nodule, follicular adenoma or carcinoma (Black et al, 1983; Klin, T.S., 1981; Lever et al, 1985; Suen et al, 1983).

Chronic thyroiditis :

Especially the Hashimoto type, a variety of lesions occur that have been mistaken for malignant neoplasm extreme infiltration with lymphoid cells may suggest lymphoma. However, the presence of mature lymphocyte often with lymphoid follicles containing a germinal centre, plasma cells, and residual thyroid follicles lined by oxyphil cells is usually

sufficient to distinguish thyroiditis from malignant lymphoma. In some cases of Hashimoto thyroiditis epithelial proliferation is prominent feature and must be differneitated from carcinoma. A small biopsy of thyroid or of extruded thyroid tissue affected by thyroiditis may lead to an erroneous diagnosis of metastatic follicular carcinoma in a lymphnode since abnormal epithelium in an abundant lymphoid stroma seen.

Aspirate characterized by the presence of numerous lymphocytic cells with a scanty admixture of follicular cells. Follicular cell may show enlarged hyperchromatic nuclei surrounded by eosinophilic granular cytoplasms.

Ravinsky and Safneck (1988) performed a study on differentiation of hashimoto's thyroiditis from thyroid neoplasm in FNAC, and concluded that distinguishing characteristics are cell arrangements, nuclear chromatin pattern and nucleolar appearance. Hashimoto's thyroiditis was characterized by flat sheets and clusters of epithelial cells with oncocytic changes or occasionally by cohesive tissue fragments with cells well oriented one to the other. Thyroid neoplasms were characterized by loosely cohesive, syncytial type tissue fragment with crowded overlapping cells poorly oriented one to the other and/or numerous isolated single cells. Second criterion is appearance of nuclear chromatin in Hashimoto's thyroiditis

O B S E R A T I O N S

OBSERVATION

The present study conducted in the Department of Pathology, M.L.B. Medical College, Jhansi. Comparises analysis of twenty seven patients of thyroid enlargement attending different surgical out patient departments and also patients admitted in M.L.B. Medical College Hospital, Jhansi.

Fine needle aspiration cytology (FNAC) was performed in all the cases, and cytological evaluation was done, which was correlated with histopathology in suitable cases. Following observations were made :

TABLE I

Sexwise distribution of cases

(Total case - 27)

S.No.	Sex	No.of cases	Percentage
1.	Male	1	3.70
2.	Female	26	96.30
	Total	27	100.00

Out of a total of 27 cases, there were 26 (96.30%) females and one case (3.70%) was male.

TABLE - II

Age-wise distribution of cases

(Total cases - 27)

S.No.	Age in years	No.of cases	Percentage
1.	1 - 10	Nil	--
2.	11 - 20	1	3.70
3.	21 - 30	13	48.15
4.	31 - 40	9	33.33
5.	41 - 50	2	7.41
6.	51 - 60	2	7.41
7.	61 - 70	Nil	--
8.	71 - 80	Nil	--
9.	81 - 90	Nil	--
	Total	27	100.00

Table - II shows age-wise distribution of cases studied. Maximum number of 13 cases (48.15%) were observed between 21 - 30 years age range, followed by 9 cases (33.33%) in 31 - 40 years age range. 2 cases (7.41%) each were observed in 41 - 50 years and 51 - 60 years age range respectively. Only one case (3.70%) was in 11 - 20 years age range.

TABLE - III

Different presenting symptoms

(Total cases - 27)

S.No.	Presenting symptoms	No.of cases	Percentage
1.	Swelling	27	100.00
2.	Pain	16	59.26
3.	Dysphagia	13	48.15
4.	Hoarseness of voice	4	14.81
5.	Palpitation	-	-
6.	Tremor	-	-
7.	Excessive puspiration	-	-
8.	Dysnoea	-	-

Table-III shows different presenting symptoms in different patients. The most common presenting symptoms was swelling found in 27 cases (100%), followed by pain, as the symptoms in 16 cases (59.26%). Dysphagia was observed in 13 cases (48.15%) and Hoarseness of voice in 4 cases (14.81%).

TABLE - IV

Different presenting signs

(Total cases - 27)

S.No.	Presenting signs	No.of cases	Percentage
1.	Unilateral swelling	17	62.96
2.	Bilateral swelling	10	37.04
3.	Exophthalmos	1	3.70
4.	Fixation to tissue	1	3.70
5.	Pulsation over gland	1	3.70
6.	Surface of gland :		
	(1) Smooth	22	81.48
	(2) Nodular :	5	18.52
	(a) Single	4	14.81
	(b) Multiple	1	3.70
7.	Consistency of gland :		
	(1) Soft and cystic	19	70.37
	(2) Firm	8	29.63

This table shows different presenting signs in cases studied 17 cases (62.96%) shows unilateral enlargement of gland and rest 10 cases (37.04%) had bilateral enlargement. The surface of gland found smooth in 22 cases (81.48%) and nodular in 5 cases (18.52%) among nodular

surface 4 cases (14.81%) was single nodule and only one case (3.70%) was with multinodular surface. Consistency was found soft or cystic in 19 cases (70.37%) and firm in 8 cases (29.63%). Exophthalmos, pulsation over gland and fixation to tissue was found in one case (3.70%) only in each.

TABLE - V

Distribution of cases on the basis of urban/rural population

(Total cases - 27)

S.No.	Rural/Urban	No.of cases	Percentage
1.	Rural	16	59.26
2.	Urban	11	40.74

As is evident from the Table-V most of the patients 16 cases (59.26%) belonged to rural areas and rest 11 cases (40.74%) belonged to urban areas.

TABLE - VI

Different thyroid lesions as observed by Fine Needle Aspiration Cytology (As per classification by Lowhagen et al, 1979).

S.No.	Thyroid lesions	No.of cases	Percentage
1.	Colloid goitre	18	66.67
2.	Thyroiditis		
	- Acute	1	3.70
	- Subacute		
	- Chronic		
3.	Neoplasms		
	(a) Adenoma	3	11.11
	(b) Carcinoma		
	- Papillary		
	- Follicular	3	11.11
	- Medullary		
	- Anaplastic	1	3.70
4.	Suspicious of malignancy	1	3.70

Table-VI shows different thyroid lesions diagnosed on cytological basis. As is evident, there were 18 cases (66.67%) of colloid goitre. Thyroiditis was observed only in one case (3.70%)

As regard neoplasms, adenoma were observed in 3 cases (11.11%). There were three cases (11.11%) of follicular carcinoma and one case (3.70%) was of anaplastic carcinoma.

In only one case (3.70%) cytology (FNAC) was suspicious for malignant changes.

TABLE - VII

Cytodiagnosis correlated with histodiagnosis in eleven cases.

S.No.	Cytodiagnosis		Histopathological diagnosis(Biopsy)		Accuracy %
	Lesions	No.of cases	Lesions	No.of cases	
1.	Goitre	6 (54.4%)	Goitre	6 (54.5%)	100
2.	Follicular adenoma	2 (18.2%)	Follicular adenoma	1 (9.1%)	50
			Papillary carcinoma	1 (9.1%)**	-
3.	Suspicious of malignancy	1 (9.1%)	Follicular carcinoma	1 (9.1%)	100
4.	Follicular carcinoma	2 (18.2%)	Follicular carcinoma	1 (9.1%)	50
			Granulomatous thyroiditis	1 (9.1%)*	-

** - False negative

* - False positive

Table-VII shows correlation of cytopathology with histopathology. In all, biopsy was performed in 11 cases (40.74%) out of 27 cases studied.

Six cases (54.5%) diagnosed goitre by cytopathology, were histopathologically confirmed as goitre, so as to give 100% accuracy. Out of two cases (18.2%) cytologically follicular adenoma, one was histopathologically confirmed as follicular adenoma (9.1%) and other was papillary carcinoma, the accuracy of follicular adenoma was 50% only. Cytologically suspicious for malignancy in one case (9.1%) was confirmed as follicular carcinoma by histology.

Cytodiagnosis of follicular carcinoma was made in two cases (18.2%) out of which one was confirmed as follicular carcinoma by histology and other case was diagnose as a case of chronic granulomatous thyroiditis. Hence percent accu racy of follicular carcinoma was found 50%.

Out of eleven cases approximately 9 cases (81.8%) were correctely diagnosed as proved histologically. Only in two cases (18.2%) cytodiagnosis not consist with histodiagnosis.

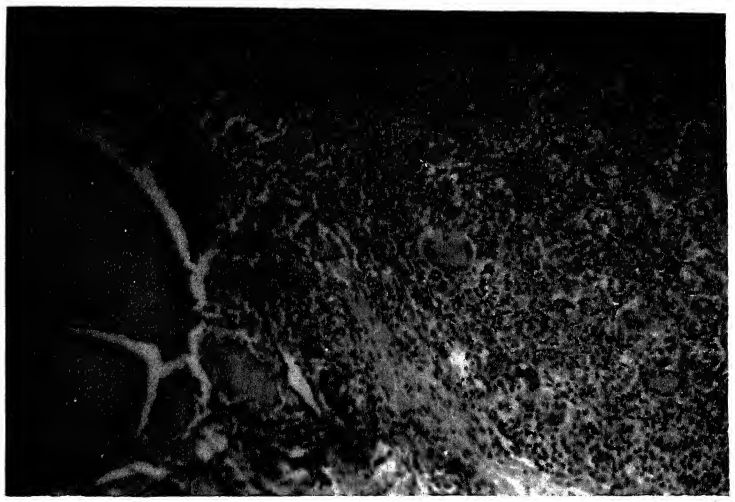
TABLE - VIII

Comparison of results following diagnosis of thyroid lesions by cytology and histopathology.

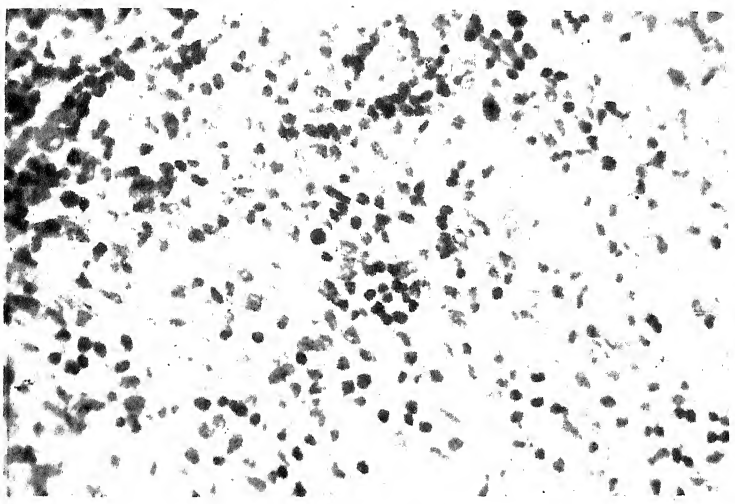
S.No.	Diagnosis	Cytodiagnosis No.of cases	Histodiagnosis	
			Positive No.of cases	Negative No.of cases
1.	Benign	8	7 (87.50%)	1 (12.50%) Diagnosed as malignant
2.	Suspicious + Malignant	3	2 (66.67%)	1 (33.33%) Diagnosed as benign lesion.

Table-VIII compares the results after cytodiagnosis and histodiagnosis. As is evident there were 8 cases diagnosed as benign cytologically but histologically 7 cases (87.50%) were proved to be benign one case (12.50%) was found to be malignant. Cytological finding as suspicious for malignant changes/malignant were observed in 3 cases. Out of which 2 cases (66.67%) were proved malignant histologically and remaining one case (33.33%) was proved to be benign.

The correct diagnosis was made in 87.50% benign cases and 66.67% malignant cases, with one false positive and one false negative case.



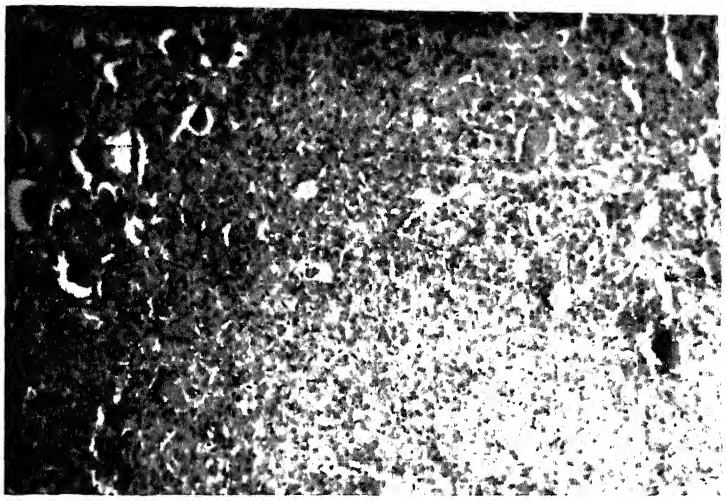
Photomicrograph showing histologic section of chronic granulomatous thyroiditis. Giant cell granuloma seen. (H & E x 70)



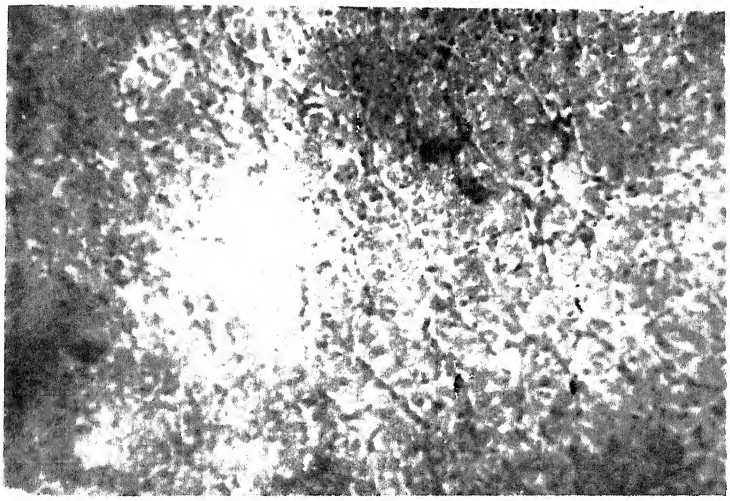
Photomicrograph showing histologic section of chronic granulomatous thyroiditis (H & E x 280).

Photomicrograph showing histologic section of colloid goitre. Follicles filled with colloid.(H&E X70)

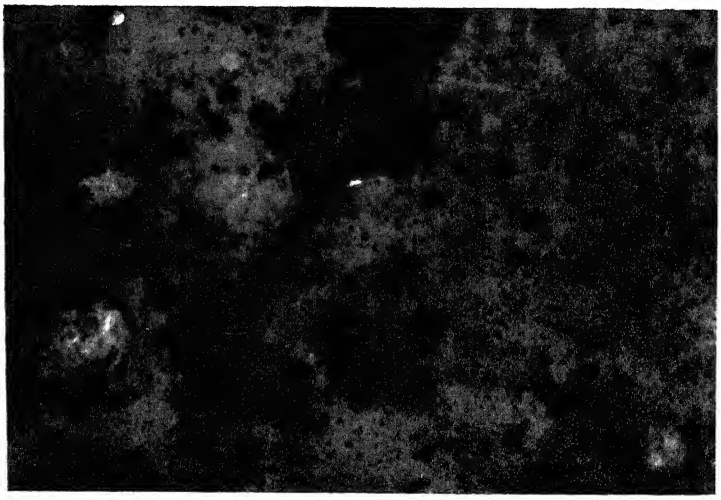
Photomicrograph showing histologic section of papillary carcinoma(H&E X70)



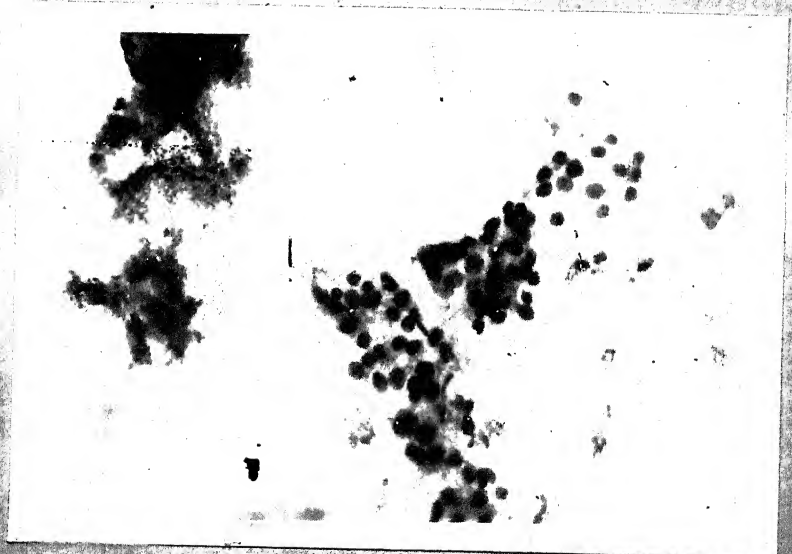
Photomicrograph showing histologic section of follicularadenoma. (H & E X 70)



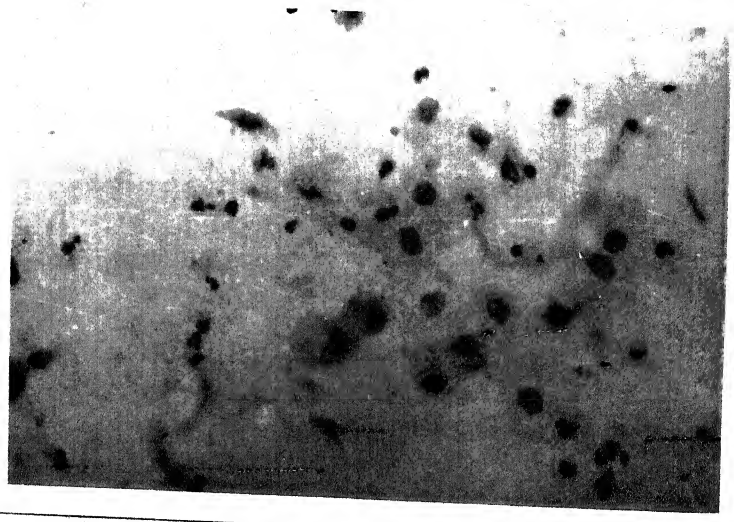
Photomicrograph showing histologic section of follicular carcinoma. (H & E X 280)



Photomicrograph showing the FNAC of acute thyroiditis : Inflammatory component is granulocytic cells (PAP ×280)

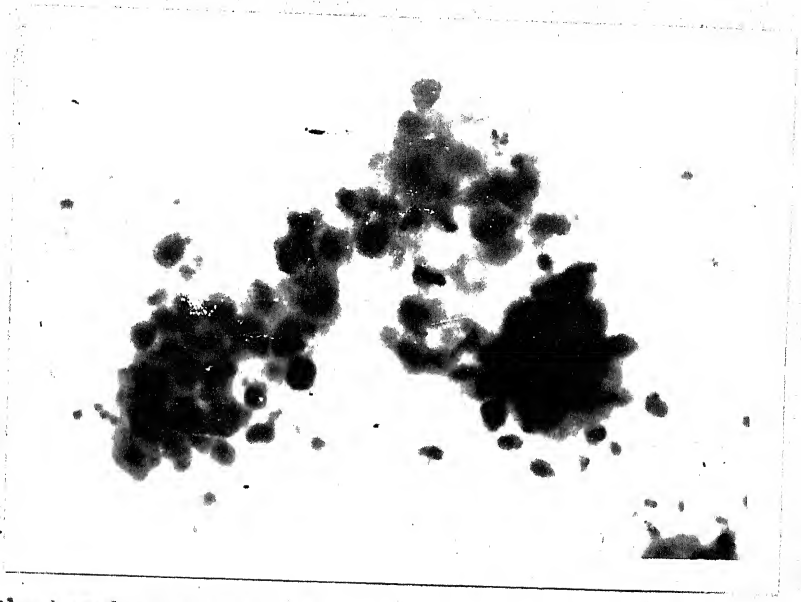


Photomicrograph showing FNAC of Adenomatous goitre (Pap. X 280)

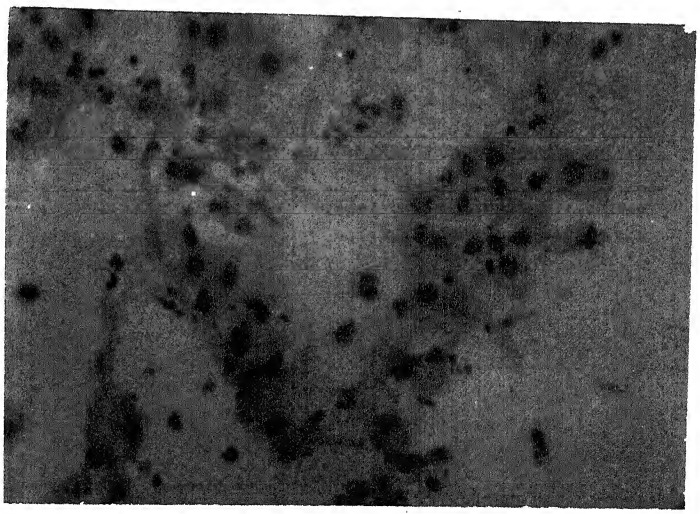


Photomicrograph showing the FNAC of colloid goitre : Colloid back ground and few follicular cells. (PAP X280)

Photomicrograph showing the FNAC of follicular adenoma: Cellularity and monomorphism, anisonucleosis of follicular cells. (PAP X280)



Photomicrograph showing the FNAC of anaplastic carcinoma giant cell type. (PAP ×280)



Photomicrograph showing FNAC of follicular carcinoma - Ansionucleosis, hypercellularity (Pap. X 280)

D I S C U S S I O N

D I S C U S S I O N

Fine needle aspiration biopsy cytology (FNAC) has been widely accepted in the diagnosis of different thyroid nodules. The high prevalence of goitres in this and other part of state has created an increased awareness of the need of practising "Selective" thyroid surgery; because by fine needle aspiration cytology neoplastic tumours can be easily differentiated from non neoplastic conditions.

The present study entitled "FINE NEEDLE ASPIRATION CYTOLOGY, ITS CORRELATION WITH HISTOPATHOLOGY IN THYROID TUMOURS" is based on 27 cases of thyroid nodules. These patients were selected from the Out Patient Department and in patients addmitted to various surgical wards in M.L.B. Medical College Hospital, Jhansi.

The purpose of this study was to determine the clinical value and accuracy of F.N.A.C. procedure in the preoperative detection of malignancy, special attention were paid to see the sensitivity, specificity and overall diagnostic accuracy of FNAC as a diagnostic tool in preoperative patients with thyroid swelling.

In present study females constituted about 96.30% whereas male constituted only 3.70%. Since present study was small and only selected type of cases were included for study. The male female ratio was 1:3. In other studies the male female ratio has been reported as 1:4.5 (Lohagen 1979), 1:6 (Geeta Jayram 1989) and 1:17 (Edneia 1989) in lymphoid lesion of thyroid.

In present study maximum number of patient were found to be between 21-30 years age range (48.15%), may be because, younger female patients reported for their neck swelling due to cosmotic reasons. Pandit and Kinare (1986) have reported only 25% patient in the above age range in their studies. As regards, patients in different age ranges, our findings are similar to findings by others (Pandit, A.A. and Kinare, 1986).

The cases mostly presented as swelling in neck associated with pain and dysphagia some cases did have hoarsness of voice.

In present series thyroid swellings were unilateral with smooth surface and of variable consistency. Other signs e.g. exophthalmos, fixation to deeper structures were observed in some cases only. Similar type of presenting signs and symptoms have been reported in the series study by different authors (Geeta Jayram et al 1989).

Most of the cases of goitres were diagnosed on the basis of abundance of colloid, some atrophic follicular cells. In cystic colloid goitres phagocytes were a frequent finding. As regards diagnostic accuracy, in all histopathology confirmed the cytological (FNAC) diagnosis of goitre in 6 cases - A diagnostic accuracy of 100% which is in accordance with the accuracy percentage (100%) reported by Aggarwal et al (1989), where as 95.8% accuracy was reported by Geeta Jayram (1985) in goitre cases.

Acute thyroiditis was observed only in one case cytologically, and histopathological correlation was not possible due to non availability of biopsy material. Thyroiditis is classified according to the predominant inflammatory cell type viz. acute thyroiditis when the inflammatory component is granulocytic. The diagnostic accuracy achieved was 100% in cases of actute thyroiditis and 70% in cases of Hashimoto's thyroiditis (Geeta Jayram 1989).

Thyroid neoplasms in (FNAC were identified by highly cellular smears with tumour patterns. Cytologically three (3) cases were observed as follicular adenoma on the basis of monomorphic aspirate, with rather cohesive small polarized sheets or acini arrnaged aroung colloid (Kline, 1981). As regards diagnostic accuracy in two cases histopathology confirmed the cytological diagnosis of follicular

adenoma in one case - A diagnostic accuracy of 50%, where as Geeta Jayram (1985) reported 100% accuracy in follicular adenoma. Histologically other cases in present study was confirmed as papillary carcinoma thyroid.

FNAC revealed follicular carcinoma in thyroid cases on the basis of an abundant, monotonous, monomorphic collection of follicular cells with slight anisonucleosis and some nuclear overlapping and crowding. They form follicles with discernable colloid as small sheets, or are isolated. The ecentric, oval nuclei, some time larger, regular nuclear membranes, fine or coarse chromatin, and prominent nucleoli (Kline 1981). As regards diagnostic accuracy in two cases; histopathology confirmes the diagnosis of follicular carcinoma in one case. A diagnostic accuracy of 50%, other case was found to be a case of chronic granulomatous thyroiditis. Whereas Geeta Jayram (1985) have a diagnostic accuracy of 21.1% and 100% accuracy was reported by Aggarwal (1989) in cases of follicular carcinoma thyroid specially cold thyroid nodules.

Anaplastic carcinoma exhibited the most malignant cell pattern. The giant cell type presented as heterogenous material composed of necrotic tissue with bizare giant cells. In present study FNAC showed only one case of giant cell carcinoma unfortunately biopsy was not available for histo-

pathological correlation. Geeta Jayram (1985) and Aggarwal (1989) both had reported 100% diagnostic accuracy in anaplastic carcinoma cases by FNAC.

Cytologically a diagnosis of suspicious for malignancy was made when the smears were very cellular shows tissue fragnents, the cells did not confirm diagnostic criteria of malignancy, but they revealed large nucleus, compared to benign smears. The honey comb pattern seen in benign lesions is present, but the cells are crowded, overlapping and pleomorphic (Pandit 1986). In present study there was one case where a diagnosis of suspicious for malignancy was made, which was later on histopathology confirmed as follicular carcinoma. There is an accordance with observations by Pandit and Kinare (1986) when all cytologically suspicious cases were confirmed as follicular carcinoma histopathologically later on.

In present study, the overall incidence of malignant neoplasm/suspicious on the basis of FNAC cases are to be approsimately 27.3%. This is in accordance with reported incidence of 29.5% (Molich 1974), 22.2% (Pandit, 1986), 22.1% (P Harsoulis 1986), whereas incidence of 44.4% reported by Aggarwal (1989) in cold thyroid nodules. As regard diagnostic accuracy of suspicious/malignant neoplasm it was 66.67% as compared to reported accuracy 65% (Harch 1989), 46.8% (Lohagen 1979), 95.4% (Aggarwal, 1989) and 100% (Pandit 1986).

TABLE - I

Statistical datas for diagnostic sensitivity, Diagnostic specificity, False positive rate, False negative rate, overall diagnostic accuracy and positive preductive value.

- Total number of cases - 11
- Cytological Benign cases- 8
  - (a) Histologically benign cases - 7 (True negative)
  - (b) Histologically malignant case - 1 (False negative)
- Cytological suspicious/malignant case- 3
  - (a) Histologically malignant case - 2 (True positive)
  - (b) Histologically benign case - 1 (False positive)

1. DIAGNOSTIC SENSITIVITY

$$= \frac{\text{True positive}}{\text{True positive + False negative}} = \frac{2}{2+1} = \frac{2}{3} = 66.67\%$$

2. DIAGNOSTIC SPECIFICITY

$$= \frac{\text{True Negative}}{\text{True Negative + False Positive}} = \frac{7}{7+1} = \frac{7}{8} = 87.50\%$$

3. FALSE POSITIVE RATE

$$= \frac{\text{False Positive}}{\text{True Positive + False Positive}} = \frac{1}{2+1} = \frac{1}{3} = 33.33\%$$

4. FALSE NEGATIVE RATE

$$= \frac{\text{False Negative}}{\text{False Negative + True Negative}} = \frac{1}{1+7} = \frac{1}{8} = 12.5\%$$

5. OVERALL DIAGNOSTIC ACCURACY

$$= \frac{\text{True Positive + True Negative}}{\text{True Positive + True Negative + False Positive + False Negative}}$$

$$= \frac{2+7}{2+7+1+1} = \frac{9}{11} = 81.81\%$$

6. POSITIVE PREDICTIVE VALUE

$$= \frac{\text{True Positive}}{\text{True Positive + False Positive}} = \frac{2}{2+1} = \frac{2}{3} = 66.7\%$$

Thus we could give a 81.8% correct diagnosis in cases of thyroid swellings as compared to Harch (1989) and Aggarwal (1989) who give 87.0% and 97% correct diagnosis respectively.

Out of eleven cases, cytologically benign cases were eight, seven were proved histologically as benign - hence, true negative, and one was histologically malignant- hence, false negative. In three cases findings were cytologically suspicious/malignant, two histologically proved malignant - true positive and one was histologically benign- false positive (Akerman 1985).

The diagnostic sensitivity on the basis, formula given in Table I- [(Ture positive)/ (True positive + False negative)] gives the probability for the method to detect a thyroid malignancy was 66.67% in this study, whereas in other reported series sensitivity was 89.2%, 57.0%, 75.0%, 68.1%, 84.6%, according to P. Harsoulis (1986); Man Akerman (1985); H. Ruben Harch (1989); S.K. Aggarwal (1989) and Schmid et al (1989) respectively.

The diagnostic specificity on the basis, given formula in Table I- [(True negative)/(True negative + False positive)] gives the probability for the method to confirm a malignant thyroid mass was 87.5% in this study. Literature shows 95.4%, 98.0%, 99.0%, 100% and 78.70%, according to P. Harsoulis et al (1986); Man Akerman et al (1985); H. Ruben Harch (1989); S.K. Aggarwal et al (1989) and Skemid et al (1989) respectively.

Over all diagnostic accuracy on the basis of given formula in Table I - [(True positive + True negative)/ True positive + True negative + False positive + False negative)] were 81.81% in our study. P. Harsoulis et al (1986) reported 94.2% over all diagnostic accuracy.

The false positive rate on the basis of given formula in Table I- [(False positive)/(True positive + False positive)] was 33.33% and P. Harsoulis et al (1986) reported 17.5%. The false negative rate on the basis of formula in Table I - [(False negative) + (False negative + True negative)] was 12.5%, P. Harsoulis et al reported 2.7%.

The percent of correct positive diagnosis expressed as the positive predictive value on the basis of formula given in Table I- [(True positive)/(Ture positive + False positive)] was observed 66.67% in our study.

The slightly low values in the statistical data is due to lesser number of cases available for correlation with histopathology.

The present study shows that FNAC is a safe and simple method with high degree of over all diagnostic accuracy, sensitivity and specificity.

C O N C L U S I O N

C O N C L U S I O N

Disease of the thyroid are of great importance because most are amenable to medical or surgical management, and nodules in the thyroid have always commoned a great deal of attention because they are some times visible, are often palpable by patient and always raised the question of cancer.

The present study entitled "FINE NEEDLE ASPIRATION CYTOLOGY, ITS CORRELATION WITH HISTOPATHOLOGY IN THYROID TUMOURS" conducted in the Department of Pathology, M.L.B. Medical College, Jhansi. Cases were selected from the out patient department and admitted patients to various surgical wards in M.L.B. Medical College Hospital, Jhansi.

The present study embodies analysis of 27 cases aged 19 years to 58 years of age. Female patients predominated over male patients 26 female and one male (Ratio 26 : 1). Majority of them hailed from rural population of Bundelkhand region.

A total of 27 cases of thyroid enlargement were studied by Fine needle aspiration cytology, and in eleven cases both classical biopsy and FNAC was performed, the results thus obtained by two procedures, were compared.

The purpose of this study was to determine the clinical value and accuracy of FNAC procedure in the pre-operative detection of malignant tumour in patients with thyroid enlargement and to evaluate sensitivity and specificity of this simple and easy technique (FNAC).

Out of twenty seven cases studied, benign lesion were found in 19 cases (70.37%), malignant lesion were in 7 cases (25.93%) and one case (3.7%) were of suspected to malignancy, as diagnosed by fine needle aspiration cytology.

In eleven cases (40.7%) which were subjected to both classical biopsy and FNAC, correct diagnosis was made in 9 cases (81.8%), false positive in one case (9.09%) and false negative in one case (9.09%).

In the present series we found, diagnostic sensitivity as 66.67%, diagnostic specificity as 87.50% with a over all diagnostic accuracy of 84.62%.

These results were compared with the results of previous workers who have also emphasized the importance of FNAC procedure as an early diagnostic tool of thyroid lesions specially neoplasms.

B I B L I O G R A P H Y

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